X1-LX Series
User Manual

EN

SolaX Power Co,. Ltd.

No.288 Shizhu Road, Tonglu Economic Development Zone,
Tonglu City, Zhejiang province, China.

Tel: +86 0571-56260011
E-mail: info@solaxpower.com

614.00038.00

Copy Decalaration
The copyright of this manual belongs to SolaX Power Co.,Ltd..Any corporation or individual should not plagiarize,partially copy or fully copy it(including software,etc.),and no reproduction or distribution of it in any form or by any means.All rights reserved.SolaX Power Co.,Ltd,.reserves the right of final interpretation. This information is subject to changes without notice.

www.solaxpower.com

Contents

1 Note on this Manual ····· 03

1.1 Scope of Validity ····· 03
1.2 Target Group ····· 03
1.3 Symbols Used ····· 03

2 Safety ····· 04

2.1 Appropriate Usage ····· 04
2.2 Important Safety Instructions ····· 06
2.3 Explanation of Symbols ····· 08
2.4 EC Directives ····· 09

3 Introduction ····· 10

3.1 Basic Feature ····· 10
3.2 Terminal of PV Inverter ····· 11
3.3 Dimensions ····· 11
3.4 Identification of X1-LX ····· 12

4 Technical Data ····· 12

4.1 DC Input ····· 12
4.2 AC Output ····· 13
4.3 Efficiency,Safety and Protection ····· 14
4.4 General Data ····· 14

5 Installation ····· 15

5.1 Unpacking ····· 15
5.2 Check for Transport Damage ····· 16
5.3 Installation Precaution ····· 16
5.4 Preparation ····· 17
5.5 Intallation Steps ····· 18
5.6 Connection of the PV Power System ····· 19
5.7 Inverter Manipulation ····· 27

6 Operation Method 28

6.1 Control Panel 28
6.2 LCD Function 29
6.3 LCD Operation 30

7 Troubleshooting 35

7.1 Troubleshooting 35
7.2 Routine Maintenance 38

8 Decommissioning 39

8.1 Dismantling the Inverter 39
8.2 Packing 39
8.3 Storage and Transportation 39
8.4 Disposal 39

1 Notes on this Manual

1.1 Scope of Validity

This manual is an integral part of inverter, It describes the assembly, installation, commissioning, maintenance and failure search of the below inverters. Please read it carefully before operating.

X1-LX 2200 X1-LX 3300 X1-LX 3600 XI-LX4600 X1-LX 5200

Store this manual where it will be accessible at all times.

1.2 Target Group

This manual is for qualified electricians. The tasks described in this manual only can be performed by qualified electricians.

1.3 Symbols Used

The following types of safety instructions and general information appear in this document as described below:

Danger !
"Danger" indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Warning !
"Warning" indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Caution !
"Caution" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

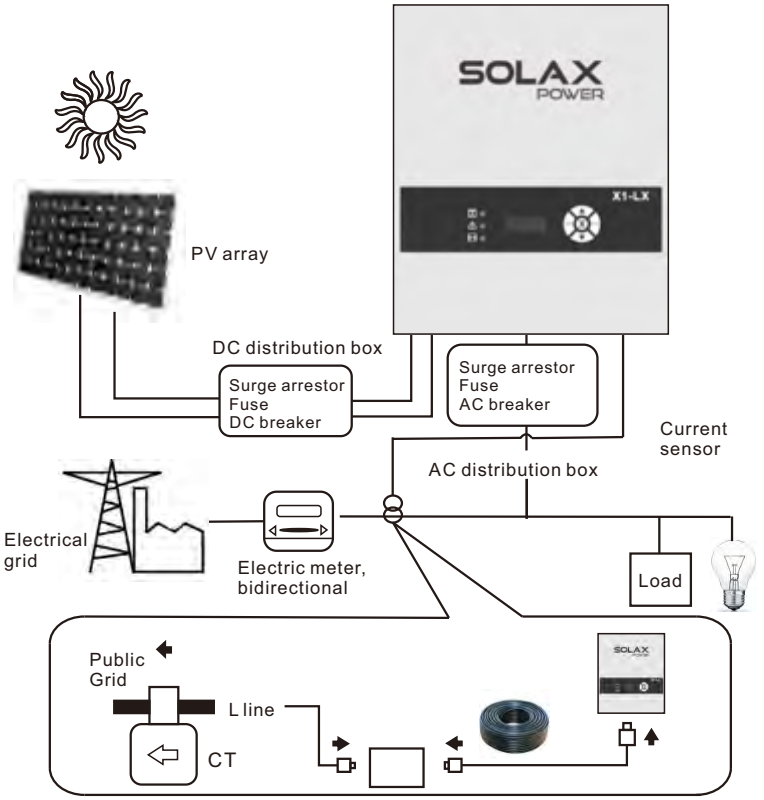
.

Note !
"Note" provides tips that are valuable for the optimal operation of your product.

2 Safety

2.1 Appropriate Usage

The X1-LX series are PV inverters which can convert the DC current of the PV generator into AC current and feed it into the public grid .



►*Surge protection devices (SPDs) for PV installation*

Warning!
Over-voltage protection with surge arresters should be provided when the PV power system installed.
The grid connected inverter is not fitted with SPDs in both PV input side and MAINS side.

Lighting can cause damage either from direct strike or from surges due to a nearby strike.

Induced surges are the more likely cause of lighting damage in majority or installations, especially in rural areas where electricity are usually by long overhead lines. Surge may be included on both the PV array conduction or the a.c. cables leading to the building.

Specialists in lighting protection should be consulted during the end use application.
Using appropriate external lighting protection, the effect of a direct lightning strike into a building can be mitigated in a controlled way, and the lightning current can be discharged into the ground.

Installation of SPDs to protect the inverter against mechanical damage and excessive stress include a surge arrester in case of a building with external lightning protection system (LPS) when separation distance is kept.

To protect the d.c. system, surge suppression device (SPD type2) should be fitted at the inverter end of the d.c cabling and at the array, located between the inverter and the PV generator, if the voltage protection level (VP) of the surge arresters is greater than 1100V, an additional SPD type 3 required for surge protection in electrical devices.

To protect the a.c system, surge suppression devices (SPD type2) should be fitted at the main incoming point of a.c supply (at the consumer's cutout), located between the inverter and the meter/distribution system; SPD (test impulse D1) in signal line according to EN 61632-1.

All d.c cables should be installed to provide as short suns as possible, positive and negative cables of the same string or main d.c supply should be bundled together to aviod creation of loops in the system.This requirement is for short runs and bunding, includes any associated earth/bunding conductors.

Spark gap devices are not suitable for use in d.c circuits as once conducting, they won't stop conducting until the voltage across their terminals is typically less than 30 volts.

2.2 Important Safety Instructions

Danger!
Danger to life due to high voltages in the inverter!
•All work on the inverter must be carried out by qualified electrician.
•The appliance is not to be used by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
•Children should be supervised to ensure that they do not play with the appliance.

Caution !
Danger of burn injuries due to hot enclosure parts!
During operation, the upper lid of the enclosure and the enclosure body may become hot.
•Only touch the lower enclosure lid during operation.

Caution !
Possible damage to health as a result of the effects of radiation!
Do not stay closer than 20 cm to the inverter for any length of time.

Note !
Grounding the PV generator.
Comply with the local requirements for grounding the PV modules and the PV generator. Solax recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction and ground these in order to have optimal protection of the system and persons.

When using the product, please do remember the below information to avoid the fire, lightning or other personal injury:

Warning !
Ensure input DC voltage ≤Max. DC voltage .Over voltage may cause permanent damage to inverter or other losses, which will not be included in warranty! This charpter contains important safety and operating instructions. Read and keep this Operation Guide for future reference.

Warning !
Authorized service personnel must disconnect both AC and DC power from the X1-LX Series inverter before attempting any maintenance or cleaning or working on any circuits connected to the X1-LX Series inverter.

● Read all instructions, cautionary markings on the inverter, and all appropriate sections of this manual before using this inverter.

● Use only attachments recommended or sold by Solax.Otherwise may result in a risk of fire,electric shock,or injury to person.
● Make sure that existing wiring is in good condition and that wire is not undersized. Do not operate the X1-LX Series inverter with damaged or substandard wiring.
● Do not disassemble the X1-LX Series inverter. It contains no user-serviceable parts. See Warranty for instructions on obtaining service. Attempting to service the X1-LX Series inverter yourself may result in a risk of electric shock or fire and will void your warranty.
● Keep away from flammable, explosive materials to avoid fire disaster.
● The installation place should be away from humid or corrosive substance.
● Authorized service personnel must use insulated tools when installing or working with this equipment.
● PV modules shall have an IEC 61730 class A rating.
● Do not disassemble the inverter because there are high-voltage capacitances installed inside the inverter.Fatal high-voltage will remain in the inverter after its disconnection with the grid after 5 minutes.

►***PE connection and leakage current.***
● The end-use application shall monitoring of the protective conductor by residual current operated protective device (RCD) with rated fault current Ifn≤240mA which automatically disconnects the device in the case of a fault.
● DC differential currents are created (caused by insulation resistance and through capacities of the PV generator). In order to prevent unwanted triggering during operation, the rated residual current of the RCD has to be min 240m A.
The device is intended to connect to a PV generator with a capacitance limit of approx 700nF.

Warning!
High leakage current!
Earth connection essential before connecting supply.

● Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic interference.
● Make sure that grounding conductor are adequately sized as required by safety regulations.
● Do not connect the ground terminals of the unit in series in case of a multiple installation. This product can cause current with a d.c component, where a residual current operated protective (PCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of type B is allowed on the supply side of this product.
●**For United Kingdom**
●The installation that connects the equipment to the supply terminals shall comply with the requirements of BS 7671.
●Electrical installation of PV system shall comply with the requirements of BS 7671 and IEC60364-7-712.
●No protection setting can be altered.
●User shall ensure that the equipment is so installed properly,design and operated to maintain at all times comply with the requirements of ESQCR 22(1)(a).
●**For Australia and New Zealand**
●The installation of inverter must fulfill Australian national wiring rules AS-NZS3000,

AS-NZS4777.1 and AS/NZS5033.

Warning!
Do not work on the solar inverter when the device is running.

●Never touch either the positive or negative pole of PV connecting device. And never ever touch both at the same time.

Warning!
Risk of electric shock!

●The unit contains capacitors that remain charged to a potentially lethal voltage after the MAINS and PV supply has been disconnected.
●Hazardous voltage present for up to 5 minutes after disconnection from power supply.
● CAUTION-RISK of electric shock from energy stored in capacitor, never work on the solar inverter couplers. The MAINS cable, PV cables or the PV generator when power is applied. After switching off the PV power and Mains, always wait for 5 minutes to let the intermediate circuit capacitors discharge before you unplug DC input and MAINS couplers.
●When access to internal circuit of solar inverter, it is very important to wait 45 minutes before working on power circuit or demounting the electrolyte capacitors inside the device. Do not open the device before hand since the capacitors require this long to discharge sufficiently!
● Measure the voltage between terminals UDC+ and UDC with a multi-meter (impedance at least 1Mohm) to ensure that the device is discharged before beginning work (35VDC) inside the device.

2.3 Explanation of Symbols

This section gives an explanation of all the symbols shown on the inverter and on the type label.

►***Symbols on the Inverter***

Symbol	Explanation
	Operating Display
	Communication is active.
	An error has occurred, please inform your installer immediately.

►***Symbols on the Type Label***

Symbol	Explanation
	CE mark The inverter complies with the requirements of the applicable CE guildines.

	TUV certified.
	RCM mark.
	SAA certified.
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
	Danger of high voltages. Danger to life due to high voltages in the inverter!
	Danger. Risk of electric shock!
	Observe enclosed documentation
	The inverter can not be disposed together with the household waste.Disposal information can be found in the enclosed documentation.
	Don't work on this inverter until it is isolated from both mains and on-site PV generation suppliers.
	Danger to life due to high voltage. There is residual voltage in the inverter needs 45 min to discharge. Wait 45 min before you open the upper lid or the DC lid.

2.4 EC Directives

This chapter follows the requirements of the European low voltage directives,which contains the safety instructions and conditions of acceptability for the endues system, which you must follow when installing, operating and servicing the unit. physical injury or death may follow, or damage may occur to the unit. Read this

instructions before you work on the unit. If you are unable to understand the dangers, warnings, cautions or instructions, contact the manufacture or an authorized service dealer before installing. Operating and servicing the unit.

The Grid connected inverter meets the requirement stipulated in Low Voltage Directive (LVD) 2006/95/EC and Electromagnetic Compatibility (EMC) Directive 2004/108/EC. The unit is certified based on:

EN 50178:1997
EN 62109-1:2010
EN 62109-2:2011
VDE 0126-1-1:2006
VDE 4105:2011

In case if installation in PV system, startup of the unit (i.e. start of designated operation) is prohibited until it is determined that the full system meets the requirements stipulated in EC Directive (2006/95/EC,2004/108/EC, etc.)

The grid connected inverter leave the factory completely connecting device and ready for connection to the mains and PV supply ,the unit shall be installed in accordance with national wiring regulations. Compliance with safety regulations depends upon installing and configuring system correctly, including using the specified wirings. The system must be installed only by professional assemblers who are familiar with requirements for safety and EMC. The assembly is responsible for ensuring that the end system complies with all the relevant laws in the country where it is to be used. The individual subassembly of the system shall be interconnected by means of the wiring methods outlined in national/international such as the national electric code (NFPA) No.70 or VDE regulation 0107.

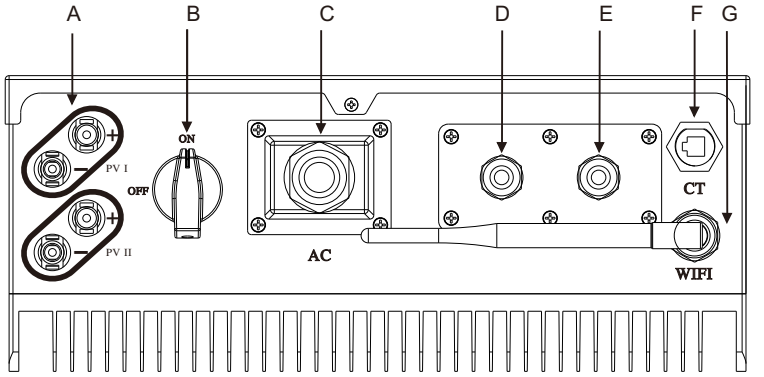
3 Introduction

3.1 Basic Features

Congratulations on your purchase of a X1-LX Series inverter from SolaX.The X1-LX inverter is one of the finest inverter on the market today,incorporating state-of-the-art technology,high reliability,and convenient control features.

●Advanced DSP control technology.
●Utilize the latest high-efficiency power component.
●Optimal MPPT technology.
- Two indepdent MPP Tracking（for X1-LX 36000/XI-LX4600/X1-LX5200）.
- Wide MPPT input range.
●Advanced anti-islanding solutions.
●IP65 protection level.
●Max.efficiency up to 97.6%.EU efficiency up to 97%.
●THD<3%.
●Safety &Reliability:transformerless design with software and hardware protection.
●Export control.
●Power factor regulation.
●Friendly HMI.
- LED status indications
- LCD display technical data,Human-machine interaction through press key.
- Dry contact communication interface.
- PC remote control.

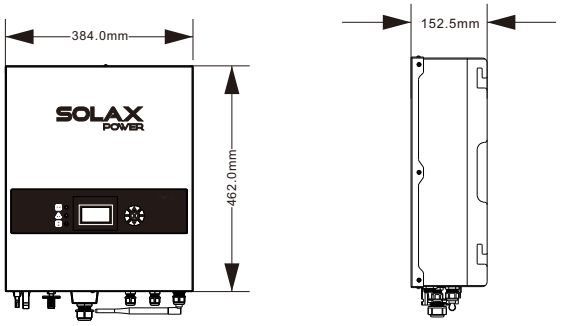
3.2 Terminals of PV inverter



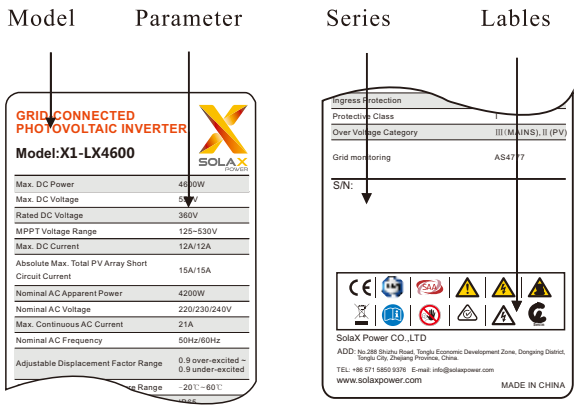
Object	Description
A	PV connector area
B	DC switch
C	AC connector
D	Ethernet connector
E	Communication port for dry contact
F	Outside current sensor
G	Wifi antenna connector

Warning !
Only qualified electrician can operate the connection.

3.3 Dimension



3.4 Identification of X1-LX



4 Technical Data

4 .1 DC Input

Model	X1-LX2200	X1-LX3300	X1-LX3600	XI-LX4600	X1-LX5200
Max. DC input power (W)	2200	3300	4000	4600	5200
Max.PV voltage(V)	550				
Rated input voltage(V)	360				
Max.DC input current per input(A)	12	12	12/12	12/12	12/12
Max.DC short-circuit per input(A)	15	15	15/15	15/15	15/15
MPPT voltage range(V)	125/530	125/530	125/530	125/530	125/530
MPPT voltage range @full load V	170/530	250/530	160/530	190/530	220/530
Start input voltage(V)	100	100	100	100	100
Start output voltage(V)	150	150	150	150	150
Shut down input voltage(V)	70	70	70	70	70
No. of MPP inputs	1	1	2	2	2
No. of strings per MPP input	1	1	1	1	1
DC switch	Optional				

4.2 AC Output

Model	X1-LX2200	X1-LX3300	X1-LX3600	XI-LX4600	X1-LX5200
Rated output power@ cosφ = 1 W	2000	3000	3680	4200	4600
Max. apparent AC power (VA)	2000	3000	3680	4200	4600
Rated grid voltage (V)	220/230/240				
Rated grid voltage range(V)	180-280				
Rated grid frequency(Hz)	50/60				
Rated grid frequency range(Hz)	45-55/55-65				
AC nominal current (A)	9	13	16	18	20
Max.output current (A)	10	14	16	20	22
Max.short-circuit current (A)	30	30	40	40	50
THD	<3%				
Max. inverter backfeed current to the array mA)	500				
Inrush current(A)	60				
Max. output fault current(A)	150				
Max. output overcurrent protection(A)	25				
Displacement power factor, adjustable	0.9 leading...0.9lagging				
Feed in phase	Single-phase				
Over voltage category	III (electric supply side), II (PV side)				

4.3 Efficiency, Safety and Protection

Model	X1-LX2200	X1-LX3300	X1-LX3600	XI-LX4600	X1-LX5200
Max. efficiency	97.60%	97.60%	97.60%	97.60%	97.60%
Euro efficiency	97.00%	97.00%	97.00%	97.00%	97.00%
MPPT efficiency	99.95%	99.95%	99.95%	99.95%	99.95%
Safety & Protection					
Over voltage/ current voltage protection	YES				
DC isolation impedance monitoring	YES				
Ground fault protection	YES				
Grid monitoring	YES				
Ground fault current monitoring	YES				
DC injection monitoring	YES				
Back feed current monitoring	YES				
Residual current detection	YES				
Anti-island protection	YES				
Over load protection	YES				
Over heat protection	YES				

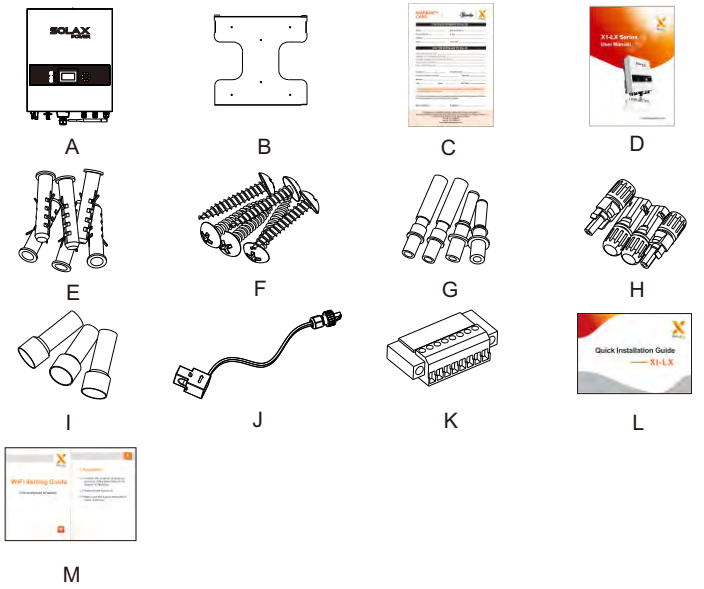
4.4 General Data

Model	X1-LX2200	X1-LX3300	X1-LX3600	XI-LX4600	X1-LX5200
Dimension (W/H/D) (mm)	384/462/152.5				
Dimension of packing	504/614/234				
Weight (kg)	21				
Gross weight (kg)	22				
Cooling concept	Natural cooling				
Noise emission	<25 dB				
Operating temperature range (°C)	-20…+60 (derating at 45)				
Store temperature (℃)	-20…+60				
Max.permissible relative humidity (non-condensing)	0%-90%				
Pollution degree	II				
Altitude (Km)	<2000				
Degree of protection	IP65				
Topology	Transformer-less				
Internal consumption (W)	<3				
LCD display	Backlight 16*4 character				
Communication interface	Ethernet/WiFi/ Dry contact				
Standard Warranty	Standard 5 years				

5 Installation

5.1 Unpacking

Check the delivery for completeness. Contact your dealer at once if anything missing.



Object	Quantity	Description
A	1	X1-LX series inverter
B	1	Bracket
C	1	Warranty card
D	1	User manual
E	6	Screw package
		6*expansion tubes
F	6	AC connector Screw package 6*expansion screws
G	2/4	DC pin contact
		2 units (1* positive ,1* negative)for X1-LX 2200/X1-LX-3300
		4 units (2* positive ,2* negative)
H	2/4	DC connectors 2 units (1* positive ,1* negative)for X1-LX 2200/X1-LX-3300 4 units (2* positive ,2* negative)
I	3	Circuit cold press terminal
J	1	Current sensor
K	1	8 pin terminal block male connector for dry connector.
L	1	Quick install guide
M	1	WIFI setting guide

Open the package and pick the product, check that if there is any distortion or impaired during the transportation. Meanwhile, check that if the relating accessories and the materials are here, you can see the accessories list in the table.
The instruction manual is an integral part of the unit and should therefore be read and kept carefully.
It is recommended that the packaging should not be removed until the unit is located in installation site.

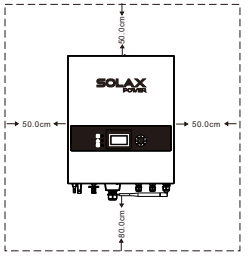
5.2 Check for transport damage

Check if the X1-LX series inverter has some visible external damage,such as cracks in the housing or display, please contact with your dealer if you find any damage.

5.3 Installation precaution

The X1-LX series inverter is designed for outdoor installation (IP65)
Make sure the installation site does not fall into none of the following conditions:
- Do not install the inverter in direct sunlight
- Do not install the inverter on flammable construction material
- Do not install the inverter in areas where highly flammable materials are stored.
- Do not install the inverter in potentially explosive areas.
- Do not install the inverter in the cool air directly.
- Do not install the inverter near the television antenna or antenna cable.
- Do not install the inverter in higher than the altitude of about 2,000 m above sea level.
- Do not install the inverter during periods of precipitation or high humidity (>95%); Moisture trapped within the location may cause corrosion and damage to the electric components.
- Install the inverter in a location that maintains an ambient air temperature which is less than 45°C ; That is to maintain a safe internal component temperature, the inverter reduce power if the ambient air temperature exceeds 45°C
- The inverter should be installed in a location that is not accessible for children.
- The inverter emits a slight vibrating noise when operating, This noise is normal and no effect on performance.
- The slope of the wall should be within ±5°.
- Keep the inverter far away from the seawater.
- The inverter is heavy, ensure the mounting place is strong enough to hold the weight of the inverter.
- If you install the inverter in a cabinet, closet or other small enclosed area, sufficient air circulation must be provided in order to dissipate the heat generate by the unit.

►***Available Space Size***



Warning !
Before installation and maintenance, AC and DC side doesn't carry electricity, but if DC side is just disconnected, capacitance still contains electricity, so please wait for at least 5 minutes to ensure the capacitors completely release the energy and inverter is not electrified.

Note !
Inverters should be installed by technician.

5.4 Preparation

Below tools are needed before installation.

Installation Tools

Installation Tools: crimping pliers for binding post and RJ45 ,screwdriver, ϕ 6 driller manual wrench and rubber hammer.

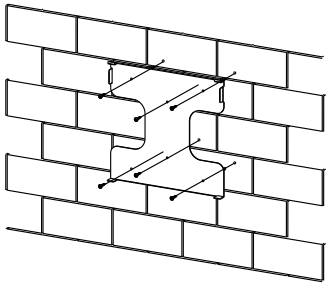
►***Lifting and Handling***
The unit is heavy. Do not lift it alone.
- During lifting procedures ensure the unit is firmly secured to avoid the risk of accidental tipping or dropping.
- Parts serving for support or immobilization of unit shall be designed and manufactured so as to minimize the risk of physical injuries and of accidental loosening of fixing.
- Ensure that the method of lifting will not allow the unit to slip from chains and slings or turn-over or slide from lifting devices.
- Transportation must be carried by specialized person (truck operators. folk-lift personal),
  equipped with necessary protection equipment (overalls, safety shoes, protective gloves, helmets, goggles)
- Do not walk or stand beneath or in the proximity of the devices.
- Avoid sudden movements and jolts when unloading and positioning the unit. Internal handling procedures must be conducted with care. Do not exert leverage on the components of the machine.
- If the unit is not balanced ,ballast should be applied. Any protruding parts should not be supported
  by hand.
- The inverter should be installed so that the operating panel shall be easily accessible-easy access to the electrical power connection point.
- Accessible for maintenance and repair work.
- Parts serving for support or immobilization of unit shall be designed and manufactured so as to minimize the risk of physical injuries and accidental loosening of fixings.

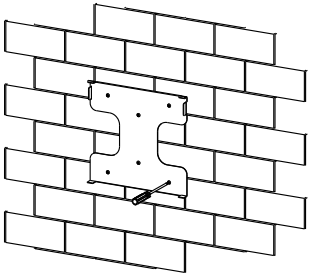
● Loading capacity and hardness of the supporting surface, load rating of mounting bracket should be at least four times the weight of the devices according to IEC62109-1. and supporting characteristics will be impaired by wear, corrosion, material fatigue or ageing, This should be calculated by inspection of the design data of supporting material and consulting construction engineer.

5.5 Installation Steps

Step1: Screw the wall bracket on the wall

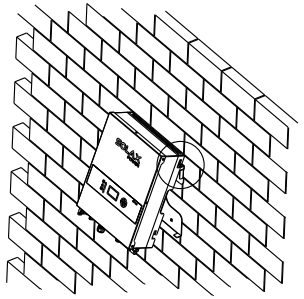
- Use the wall bracket as a template to mark the position of the six holes.
- Drill holes with ϕ6 driller carefully, make sure the holes are deep enough(at least 50mm) for install and tight the expansion tubes.
- Install the expansion tubes in the wall, screw the wall bracket using the screws in the screw package.

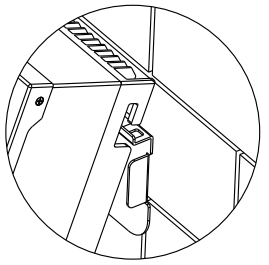




Step2: Hang the X1-LX inverter on the wall bracket

- To install the inverter, please hold on the side slots to position on the wall.
- Please match the inverter with the bracket.
- Please make sure the metal hook on the top side of the inverter match with the slot on the bracket and hang the inverter on the wall.





Step3: Check the installation status

- Check if the inverter hangs on the bracket steady and complete the installation process.

5.6 Connections of the PV power system

5.6.1 The main steps to connect the X1-LX system

- PV string connection
- AC output connection
- Current sensor connection
- Wifi connection

►*PV String*

Warning!
PV module voltage is very high which belongs to dangerous voltage range, Please comply with electric safety rules when connecting.

Warning!
When the photovoltaic array is exposed to light, it supplies a D.C voltage to the PCE.

Warning!
When there is something wrong with the modules arrays. Modules can be connected with inverter only after eliminating these problems.

X1-LX series inverters can be connected in series into 2-strings PV modules for 3.6KW,4.6KW and 5.2KW,and 1-string for 2.2KW and 3.3KW.
Select PV modules with excellent function and reliable quality. Open-circuit voltage of module arrays connected in series should be <Max. DC input voltage; operating voltage should be conformed to MPPT voltage range.

Max. DC Voltage Limitation

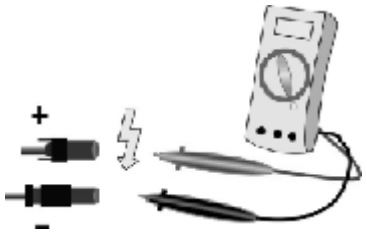
Model	X1-LX2200	X1-LX3300	X1-LX3600	XI-LX4600	X1-LX5200
Max. DC Voltage	550V				
MPPT voltage range	125-530V				

Note!
The following requirements of PV modules need to be applied for each input area;

- Same type
- Same quantity
- Identical alignment
- Identical tilt

Please use PV cable to connect modules to inverter.From junction box to inverter voltage drop is about 1-2%. So we suggest the inverter install near PV module, in order to save cable and reduce DC loss. (No longer than 30m)

Note!
Please do not make PV positive or negative ground!

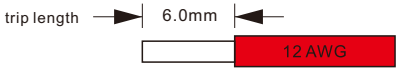


-Use multimeter to measure module array voltage.

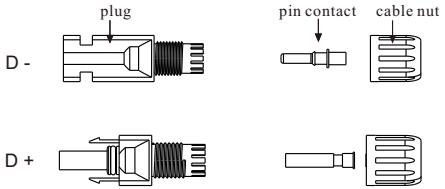
-Check the PV+ and PV- fromthe PV string combiner box correctly.Make sure the PV+and PV- connected correctly.

●Connection Step:

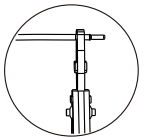
1. Disconnect the DC switch.
2. Choose the 12 AWG wire to connect the PV module.
3. Trip 6mm of insulation from the Wire end.



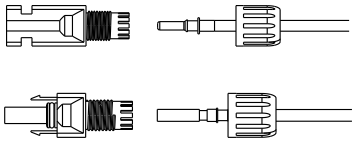
4. Separate the DC connector as below.



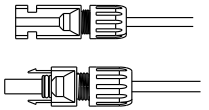
5. Insert striped cable into pin contact and ensure all conductor strands are captured in the pin contact.
6. Crimp pin contact by using a crimping pliers. Put the pin contact with striped cable into the corresponding crimping pliers and crimp the contact.



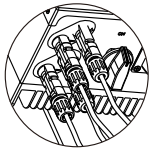
7. Insert pin contact through the cable nut to assemble into back of the male or female plug. When you feel or head a “click” the pin contact assembly is seated correctly.



8. Tight the DC connector.
   a. Slide the cable nut towards the back shell.
   b. Rotate the cable nut to secure the cable.



9. After securing the cable tightly, align the 2 half connectors and mate them together by hand until a “click” is felt or heard.



10. Separate the DC connector
    a. Use the specified wrench tool.
    b. When separate the DC+ connector, push the tool down from up side.
    c. When separate the DC- connector, push the tool down from the bottom side.
    d. Separate the connectors by hands.

Warning!
Before connecting, disconnect the connection between solar generator and inverter and lock the DC switch to the open position during installation. Place a warning sign “Do not turn on maintenance in progress” on the external disconnecting switch,when it is shut down, and make sure that on-off remote controls are inhibited.

► *AC Output*

Warning!
Must comply with the connection requirement of your distribution grid.

X1-LX series inverters are designed for single phase grid. Voltage range is 220V/230V/240V according to different countries, the typical frequency is 50/60Hz. Other technical requests should comply with the requirements of local public grid. For the terminal and cable design please follow below requirement.

Terminal Specification and Definition

	Connection type	Rated connecting capacity and rating	Tightening torque	Stripping length
Protective earthing connection	Torx-head Screw(m5)	----------	1.8-2Nm	10mm
DC input connection	Amphenol(MC4)		1.8-2Nm	----------
ACoutput connection	Heavy power	30A 380V	1.8-2Nm	----------
RS485	connector	----------	----------	----------

Earth conductor: PE screw terminal designed for clamping a cable lug or bar by means of a screw, nut and locking washer, before PE connection, strip the conductor end 10mm long to fit them into a cable lug or bar. For PE connection, the length of conductors between the cord anchorage and the terminal shall be such that the current-carrying conductors became taut before the earthing conductors if the cable slips out of the cord anchorage.

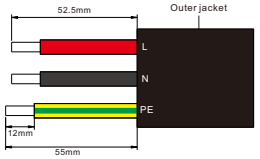
Model	X1-LX2200	X1-LX3300	X1-LX3600	XI-LX4600	X1-LX5200
Cable(Cu)	4mm2	4mm2	4mm2	5mm^2	5mm^2
Micro-Breaker	15A	20A	20A	25A	25A

Warning!
Make sure you select the correct specification cables for installation. Otherwise the power will make the cable hot or burnt, it could result in death or serious injury.

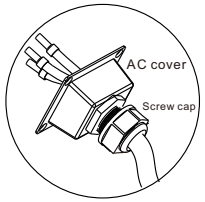
Connection Step:

1. Check the grid voltage and compare with the permissible voltage range.(see technical data).
2. Disconnect the circuit-breaker from all the phases and secure against reconnection.
3. Open the AC lid on the back of the inverter.

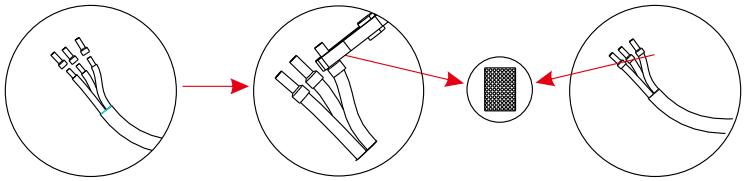
4. Trip the wires:
   a. Trip all the wires to 52.5mm and the PE wire to 55mm.
   b. Use the crimping pliers to trip 12mm of insulation from all wire ends as below



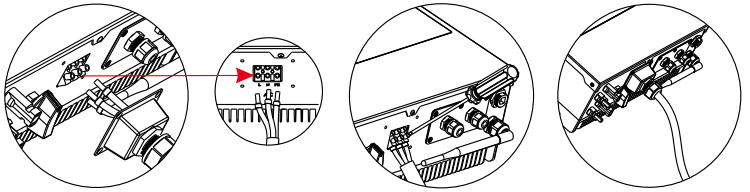
5. Put the cable through the AC components from the screw cap to the AC cover.



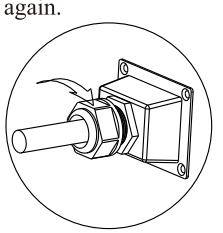
6. Insert striped cable into AC terminal and insure all conductor strands are captured in the AC terminal. Compress the AC terminal head by using a crimping pliers and screw down screw cap tight.Cable core section after crimp should be the section as below.



7. Insert the terminal into the corresponding holes（L-L , N-N , PE-PE）and fasten them by screwdriver.



8. Confirm all the wires are screwed down.
9. Screw down screw cap again.



►***Selection of fuse and cables***

Mains cable (AC line cable) shall be short circuit protected and thermal overload protected.

Always fit the input cable with fuse. Normal gG(US:CC or T) fuses will protect the input cable in short circuit situation. They will also prevent damage to adjoining equipment.

Dimension the fuses according to local safety regulations, appropriate input voltage and the relate current of the solar inverter.

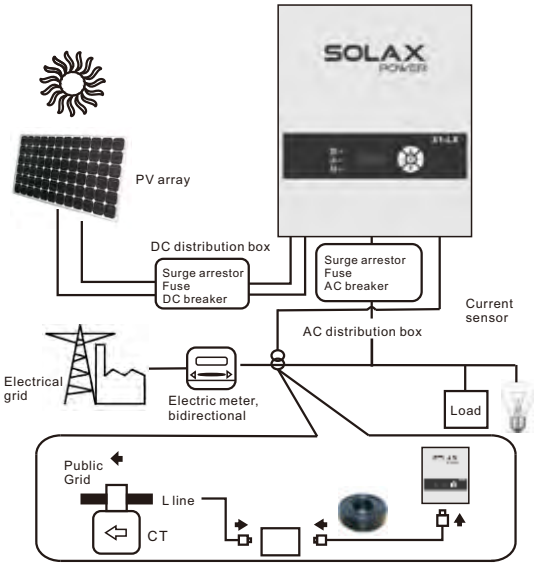
AC output protected by external fuse (gG rated current 15A/250VAC for 2.2KW ,gG rated current 20A/250VAC for 3.3KW and 3.6KW; 25A/250VAC for 4.6KW and 5.2KW) provides in all live connections to the AC supply.

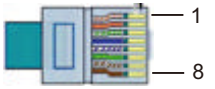
The rated short circuit breaking capacity of the above protective device shall be at least equal to the prospective fault current at the point of installation. See section technical data of this manual for details.

AC output cable: Cu, L, N+PE,2*5 .0+5.0mm^2 @40°C ambient with a max length if 5m with operating time of the fuse is less than 5 seconds, installation method B2 according to EN60204-1:2006,annex D: cable in conduit cable trunking system, number of loaded circuit only one . Use H07RNF (cord designation 60245 IEC66) for an ambient temperature between 40°C and 60°C.

Note1: For conditions differing from those mentioned above ,dimension the cables according to local safety regulations, appropriate input voltage and the load and the load current of the unit.(You can choose a thicker cable but the fuses must rated according to the cable.)
Note2: Fuses must be approved by Notified Body.
Inverter is not provided galvanic isolation from the mains to the PV array, backfeed current to the array is15A/250VAC for 2.2KW ,20A/250VAC for 3.3KW and 3.6KW; 25A/250VAC for 4.6KW and 5.2KW ,based on the fuse provided in the mains. Also in the worst case ,the reverse current comprises the sum of the short-circuit currents of all intact lines.
Therefor the current-carrying capacity of the components and sub-assemblies provided in the end-use system(connectors ,cables, junction box, switch ger,etc.),and the reverse current PV module shall be considered based on the backfeed current and reverse current. The direct current (DC) circuit breaker or fuse between each solar generator and inverter shall be provided based on solar inverter input ratings.
Select DC cables based on the above inverter backfeed current and Isc PV rating and Vmax ratings.

► ***Current sensor connection***
The current sensor measure the current on the phase wire that runs between the inverter and the grid. This enables the inverter to determine the power requirements of the connected consumer. The current sensor is connected to CT port on the inverter.
Connection Step:
1. Insert the RJ45 terminal on the current sensor into the CT port on the inverter.
2. Place the current sensor around the phase wire L to which the inverter is connected.
3. Place the current sensor around the phase wire L to measure the current going to or coming from the grid.
4. Make sure the current sensor is installed in the right direction: The arrow on the current sensor must point to the Public grid.





When connection the RJ45 connector with the wire of the CT ,please follow the below sequence:

Pin	1	2	3	4	5	6	7	8
CT	Red wire	X	X	X	X	X	X	Green wire

Note!
Do not place the sensor on the N wire or the earth wire.
Do not place the sensor on the N and L wire simultaneously.
Do not place the sensor on the L wire going to the consumer.
Do not place the sensor with the narrow pointing to the energy meter.
Do not place the sensor on the non-insulated wires.
Do not use the wire over 25m.

Note!
The sensor can be upgrade to meter.
With a one phase meter provided by SolaX can monitoring the 24hr usage of electric.

► ***WiFi connection***
WIFI communication interface is a standard interface,you can check details in the internet either from PC or smartphone with wifi monitoring.

Connection Step:
1. Install the antenna on the inverter.
2. Connect the WiFi with the router.(as described in the WiFi setting guide)
3. Set the station account on the Solax web.(as described in the WiFi setting guide)

5.6.2 Communication interface

This product has a series communication interfaces: such as LAN, Wifi (optional), Dry contact and Extend port and for human and machine communication. Operating information like output voltage, current, frequency, faulty information, etc., can be delivered to PC or other monitoring equipment via these interfaces.

① **LAN**
● Communication
LAN communication is one standard communication interface. It transmits the data between the router and X1-LX series inverters in the local area network. User can set the parameters with specialized software provided by Solax.
The pin definition of the connector show below.

Pin	1	2	3	4	5	6	7	8
Function	TPTX+	TPTX-	2.5V	GND	GND	2.5V	TPRX+	TPRX-

● Connection steps:

1. Prepare two RJ45 connectors and a communication cable.
2. Trip the insulation from the communication cable.
3. Insert the communication cable into the RJ45 connector following the PIN definition rule.
4. Crimp the RJ45 connector with the crimping plier.
5. Repeat the above steps to fix the other head of the communication cable.
6. Insert one side of the cable into the LAN connector on the inverter, and the other side of the cable into the router.

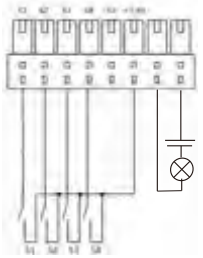
② **Dry contact**

●Communication

Dry contact is provided to give a remote monitor and remote control with the optional accessory. The remote monitor function provides an indication on the inverter's working status. The remote control function provides a contact signal to operate the inverter. The dry contact communication use terminal blocks. The PIN definitions and the circuit connection are as below.

PIN	1	2	3	4	5	6	7	8
Definition	Remote control for reactive power regulation						Remote monitor	

Note: The external connection of PIN7 and PIN 8 must within the range of 300V 2A.



●Connection steps

1. Choose at least 1mm^2 wire. Trip the insulation from the wire ends.
2. Insert the tripped wire into the hole of the terminal block.
3. Screw down the screws on the terminal block.

5.7 Inverter Manipulaition

▶***Start inverter after checking all below steps***

- Check that the device is fixed well on the wall.
- Make sure all the DC wirings and the AC wirings are completed.
- Make sure the CT is connected well.
- Turn on the external AC and DC connector.
- Turn on DC switch to the “ON” position.

▶***Start inverter***

- Inverter will start automatically when PV panels generate enough energy.
- Check the status of LED and LCD screen, the LED should be green and the LCD screen should display the main interface.

●If the LED is not green, please check the below:

- All the connections are right.
- All the external disconnect switches are closed.
- The DC switch of the inverter is in the “ON” position.

Below is the three different states when operating,which means inverter starting up successfully.

Waiting: Inverter is waiting to checking when DC input voltage from panels is greater than 100V(lowest start-up voltage) but less than 150V(lowest operating voltage).

Checking:Inverter will check DC input environment automatically when DC input voltage from the PV panels exceeds 150V and PV panels have enough energy to start inverter.

Normal: Inverter begins to operate normally with green light on.Meanwhile,feedback energy to grid ,LCD displays present output power.

Enter the setting interface.

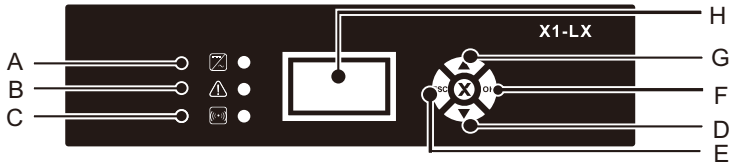
●Set the safety standard as page 32.
●Set the system time as page 32.
●Set the PV connection mode as page 32.
●Set WiFi according to the WiFi setting guide.

Warning!
Power to the unit must be turned on only after installation work has been completed. All electrical connections must be carried out by qualified personnel in accordance with legislation in force in the country concerned.

Note!
Please set the inverter if it is the first time to start up.
Above steps is for the regular start up of the inverter. If it is the first time to start up the inverter, you need to setup the inverter .

6 Operation Method

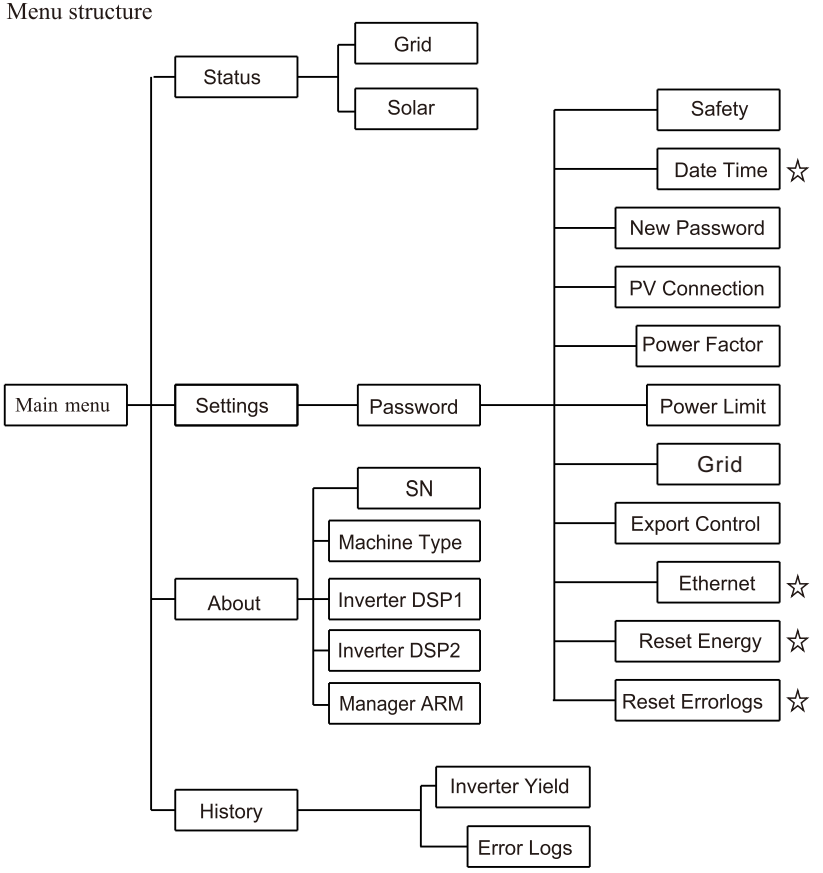
6.1 Control Panel



Object	Name	Description
A	Indicator LED	Green: The inverter is in normal state.
B		Red: The inverter is faulty.
C		Yellow: The inverter is in communication.
D	Function Button	Down button: Move cursor to downside or decrease value.
E		ESC button: Return from current interface or function.
F		OK button: Confirm the selection.
G		Up button: Move cursor to upside or increase value.
H	LCD Screen	Display the information of the inverter in this LCD screen.

6.2 LCD Function

Menu structure

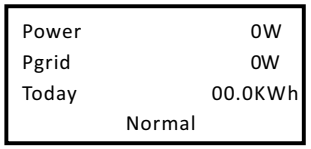


Note: "☆"Can be set by the end user.
Others can only be set by the technical or the intaller with the installer password.

6.3 LCD Operation

● LCD Digital Display

The main interface is the default interface, the inverter will automatically jump to this interface when the system started up successfully or not operated for a period of time. The information of the interface is as below. “Power” means the timely output power; “Pgrid” means the power export to or import from the grid.“Today” means the power generated within the day. “Normal” show the status of the inverter.

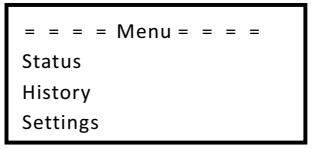


● Menu interface

The menu interface is a transfer interface for user to get into the other interface to finish the setting or getting the information.

-User can get into this interface by pressing “Ok”button when LCD displays the main interface.

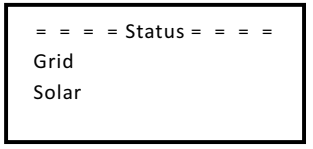
-User can select interface by moving the cursor with the function button， and press “OK” to confirm.



● Status

The status function contains two aspects of the inverter, the grid and solar.

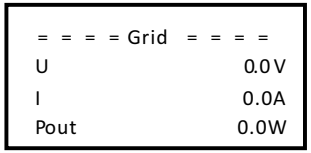
Press up and down to select and press “OK” to confirm the selection, press “ESC” to return to the Menu.



a) Grid

This status shows the current grid condition such as voltage, current, output power and the local consumed power . Pout measures the output of the inverter,Pgrid measures the power export to or import from the grid.Positive value means the energy feed into grid,the negative value means the energy used from the grid.

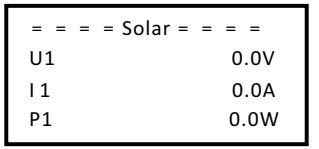
Press up and down button to review the parameter, Press “ESC” to return to Status .



b) Solar

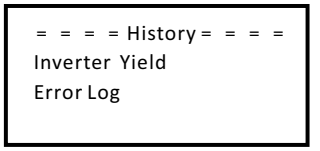
This status shows the real time PV condition of the system. The input voltage ,current and power situation of each PV input.

Press up and down button to review the parameter, Press “ESC” to return to Status



● History

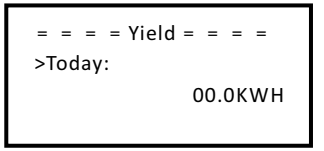
The history function contains two aspects of the information: Inverter yield and error log. Press up and down to select ,and press “OK” to confirm the selection, press “ESC” to return to the Menu..



c) Inverter Yield

The inverter yield function contains the energy generated by today， yesterday , this month ,last month and total。

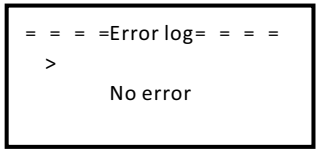
Press up and down button to review the parameter, Press “ESC” to return to history



d) Error log

The Error log contains the error information happend, It can record for three items.

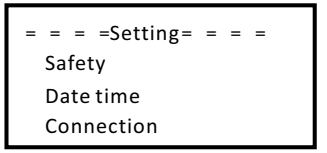
Press up and down button to review the parameter, Press“ESC” to return to History.



● Settings

Setting function is used for setting the inverter for time， connection , Ethernet, Grid and so on.

Since this function will change the inverter's parameter.,the end user with the user password as”0000” have the limited authority to change the setting.We need installer password to do most of the professional setting.



e) Password

The default password is “0000”for end user,which only allows the user to review the current setting and some easy setting.If professional change is needed,please contact with the distributor or factory for installer password.We need to increase or decrease the word by pressing up or down button. Press OK to confirm analternate to the next word. After all when the word is confirmed. Press “OK” to enter password.

```
= = = =Password= = = =

  0  0  0  0
```

f) Safety

The user can set the safety standard here. According to different countries and grid tied standards. There are 9 standards for choice(May change without notice).

Item	1	2	3	4	5	6	7	8	9
Standard	VDE0126	EN50438_DK	CEB	EN50438_NL	E8001	C10/C11	G83/2	AS4777	ARN4105
Country	Germany	Danmark	UK	Netherland	Austria	Belgium	UK	Australia	Germany

```
= = = =Safety= = = =
>country
        VDE0126
```

g) Date time

This interface is for user to set the system date and time. Increase or decrease the word by pressing up or down button. Press OK to confirm and alternate to next word. After all the words are confirmed. Press “OK” to enter the date and time.

```
= = = =Date time= = = =

 2013 >06 <06
 10 19
```

h) New Password

Installer can set the new password here. We need to increase or decrease the word by pressing up or down button. Press OK to confirm and alternate to next word. After all the word is confirmed. Press “OK” to reset the password.

```
= = =New Password= = =

   1 2 3 4
```

I) PV Connection

This function can set the mode of PV input. There are two modes for choice: Comm and Mul. The “Comm” mode means single MPP tracking,2 MPPT working together; “Mul” means multi-MPP tracking,2 MPPT working independently. Press up or down button to select and press “OK” to confirm.


```
= = =PV Connection= = =

 PV Connection
 Comm
```

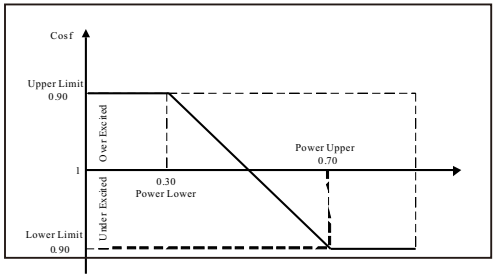
j) Power factor(For specific country if required by the local grid)

User can set the power factor here. There is 4 modes for select: OFF, Under-Excited, Over-Excited, Curve.

Select “off “to turn off this function. Select “Under-Excited “ to set the inductive power factor. Select “Over -Excited “ to set the capacitive power factor . Select Curve to set the power factor including “Upper limit“， “Lower limit“, “ power upper“ and “power lower“ according to below curve. “upper limit“ and “Lower limit“ can set the parameter from 0.90 to 1.00. “power upper “ and “power lower “ can set the parameter from 0.00 to 1.00.

```
= = =Power factor= = =
 >Mode select

 Off
```



k) Power limit

User can set the power limit here, the setting value is from 0.00-1.00.

```
= = =Power Limit= = =
>Proportion

 0.00
```

l) Grid

Usually user does not need to set the parameters here,as when you select the safety the default value will be used according to the safety rules.The parameters here is described as below.If need to reset,please contact with your installer.Any changes should according to the requirement of local grid. Press up or down button to select and press “OK” to confirm.

```
= = = = Grid = = = =
>Vac Upper

 000.0
```

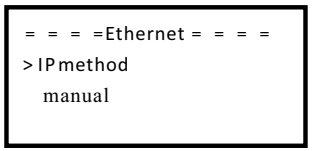
Parameter	Comment
Vac upper	Voltage high protect
Vac lower	Voltage low protect
Vac upper slow	Voltage high slow protect
Vac lower slow	Voltage low slow protect
Fac upper	Frequency high protect
Fac lower	Frequency low protect
Fac upper slow	Frequency high slow protect
Fac lower slow	Frequency low slow protect
Vac 10m avg	10 min voltage high protect

m) Export control

With this function the inverter can control energy exported to the grid. There is user value and factory value.The factory value is default which can not be changed by user.The value setting by installer must be less than the factory value and within the range of the CT as 5KW or the meter as 13KW. Press up or down button to select and press “OK” to confirm.

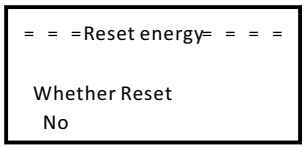
n) Ethernet

Users can set the information about Ethernet here .There are two methods for setting:manual and Auto.With “manual”,users should input the information such as IP address, subnet mask number and default gateway number by pressing up or down botton. With “Auto”,it can obtain above information automatically.



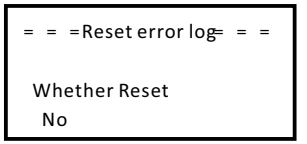
o) Reset energy

User can reset the energy record here. Press up or down button to select and press “OK” to confirm.



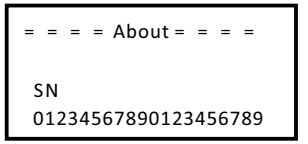
p) Reset error log

User can reset the error log here. Press up or down button to select and press “OK” to confirm.



● About

This interface shows information of the inverter , such as series numbers and software version.



7 Troubleshooting

7.1 Trouble shooting

This section contains information and procedures for solving possible problems with X1-LX series inverters, and provides you with troubleshooting tips to identify and solve most problems that could occur with the X1-LX series inverters.

This section will help you narrow down the source of any problems you may encounter. Please read the following troubleshooting steps.

- Check warnings or fault messages on System Control Panel or Fault codes on the inverter information panel. If a message is displayed, record it before doing anything further.
- Attempt the solution indicated in below table.

Faults	Diagnosis and solution
SPI Fault	SPI communication fault
	-Disconnect PV+ , PV- , reconnect them.
	-Or seek help from us, if can not go back to normal state.
SCI Fault	SCI communication fault
	-Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state.
CAN1 Fault	CAN communication fault
	-Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state.
PV Config Fault	PV Connection Setting Fault
	Reset the PV connection
	-Or seek help from us, if can not go back to normal state.

Inv EEPROM Fault	Inverter EEPROM fault
	-Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state.
Relay Fault	Relay Fault
	-Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state.
Sample Fault	The detection circuit Fault
	-Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state.
RCD Fault	Residual Current Device Fault
	- Check the impedance of DC input and AC output.
	- Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state.
AC HCT Fault	AC Current sensor Fault
	- Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state
DC1 HCT Fault DC2 HCT Fault	DC Current sensor Fault
	- Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state
DCI Fault	DCI Device Fault
	- Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state
TZ Protect Fault	Over current fault.
	- Wait for a while to check if go back to normal status.
	- Disconnect PV+ , PV-, reconnect them.
	-Or seek help from us, if can not go back to normal state
Grid Lost Fault	Grid is lost.
	-System will reconnect if the utility is back to normal.
	-Or seek help from us.
Grid Volt Fault	Grid Voltage out of range
	-System will reconnect if the utility is back to normal.
	-Or seek help from us.
Grid Freq Fault	Grid Frequency out of range
	-System will reconnect if the utility is back to normal.
	-Or seek help from us.
PLL Lost Fault	The grid is not good.
	- System will reconnect if the utility is back to normal.
	- Or seek help from us.
Bus Volt Fault	Bus Voltage out of normal range.
	- Disconnect PV+ , PV-, reconnect them.
	- Check if the PV input is within the range of the inverter.
	-Or seek help from us, if can not go back to normal state

AC5M Volt Fault	The grid's Voltage is out of range for the last 5 Minutes.
	-The system will back to normal if the grid is back
	-Or seek for help from us.
Inv OCP Fault	Inverter over current protection Fault
	-Wait for a while to check if back to normal.
	- Or seek for help from us.
DCI OCP Fault	DCI over current protection Fault.
	-Wait for a while to check if back to normal.
	- Or seek for help from us.
RC Fault	Residual Current Fault
	-Wait for a while to check if back to normal.
	- Or seek for help from us.
PV Volt Fault	PV Voltage Fault
	-Check the output of the PV voltage.
	-Or seek for help from us.
AC10M Volt Fault	The grid's Voltage is out of range for the last 10 Minutes.
	-The system will back to normal if the grid is back
	-Or seek for help from us.
Isolation Fault	Isolation Fault
	-Check the connection of the inverter.
	- Or seek for help from us.
Temp Over Fault	Temperature Over the limitation
	Check whether the envirement temperature is over limitation.
	-Or seek help from us.
Other device Fault	Other device fault.
	-Turn off the PV and grid ,reconnect them.
	- Or seek for help from us.
SW OCP Fault	Over current fault detected by software.
	-Turn off the PV and grid ,reconnect them.
	- Or seek for help from us.
RTC Fault	RTC Fault
	-Turn off the PV and grid ,reconnect them.
	- Or seek for help from us.
Mgr EEPROM Fault	Manager EEPROM Fault
	-Turn off the PV and grid ,reconnect them.
	- Or seek for help from us.
Mgr CAN Fault	Manager CAN Fault
	-Turn off the PV and grid ,reconnect them.
	- Or seek for help from us.

- If your inverter's information panel is not displaying a Fault light, check the following list to make sure that the present state of the installation allows proper operation of the unit.
  - — Is the inverter located in a clean, dry, adequately ventilated place?
  - — Have the DC input breakers been opened?
  - — Are the cables adequately sized and short enough?
  - — Are the input and output connections and wiring in good condition?
  - — Are the configurations settings correct for your particular installation?
  - — Are the display panel and the communications cable properly connected and undamaged?

  Contact Solax Customer Service for further assistance. Please be prepared to describe details of your system installation and provide model and serial number of the unit.

7.2 Routine maintenance

Inverters do not need any mainteinance or correction in most condition,but if the inverter often loses power due to overheating,this can be the following reason:

- The cooling fins on the rear of house are coverd by dirts.

Clean the cooling fins with a soft dry cloth or brush if necessary.

Only trained and authorized professional personnel who are familiar with the requirements of safety was allowed to perform servicing and maintenance work.

► ***Safety checks***

Safety checks should be performed at least every 12 mouths by manufacturer's qualified person who has adequate training,kownledge,and practical experience to perform these tests.The data should be recorded in an equipment log.If the device is not functioning properly or fails any of test,the device has to be repaired.For safety check details ,refer to this manual,section 2 Safety instruction and EC Directives.

►***Maintain periodically***

Only qualified person may perform the following works.

During the process of using the inverter,the manage person shall examine and maintain the machine regularly.The concrete operations are follow.

1: Check that if the cooling fins on the rear of house are covered by dirts,and the machine should be cleaned and absorbed dust when necessary.This work shall be check time to time.

2: Check that if the indicators of the inverter are in normal state,check if the keys of the inverter are in normal state,check if the display of the inverter is normal.This check should be performed at least every 6 months.

3: Check that if the input and output wires are damaged or aged.This check should be performed at least every 6 months.

4: You should get the inverter panels cleaned and their security checked at least every 6 months.

8 Decommissioning

8.1 Dismantling the Inverter

- Disconnect the inverter from DC Input and AC output.
- Wait for 5 minutes for de-energizing.
- Disconnect communication and optional connection wirings.
- Open the anti-theft lock.
- Remove the inverter from the bracket.
- Remove the bracket if necessary.

8.2 Packaging

If possible, please pack the inverter with the original packaging.

If it is no longer available, you can also use an equivalent carton that meets the following requirements.

- Suitable for loads more than 30 kg.
- With handle.
- Can be fully closed.

8.3 Storage and Transportation

Store the inverter in dry place where ambient temperatures are always between -20 °C - +60 °C.Take care of the inverter during the storage and transportation,keep less than 4 cartons in one stack.

8.4 Disposal

When the inverter or other related components need to be disposed. Have it carried out according to local waste handling regulations. Please be sure to deliver wasted inverters and packing materials to certain site, where can assist relevant department to dispose and recycle.